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ABSTRACT

Beliefs about memories and about the ability to recall memories may affect the individual's recollection of facts and "events." What people believe about memory is investigated using previously analyzed and reported responses to the Beliefs about Memory Survey (BMS). The survey sample (N=1046) was randomly divided for calibration and replication analyses. Rasch models were derived and tested for fit. Analysis of the two samples and combined sample yielded similar results. While the principal components approach indicate three dimensions, Rasch methods support a unidimensional interpretation for a single memory beliefs variable. Group differences were investigated. The use of Rasch versus principle components modeling is discussed. Psychometric conclusions and applications of the findings in therapy, education and the legal system are discussed. BMS is appended along with tables and maps showing the analyses performed. (EMK)

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ED 420 011

Running Head: MEMORY BELIEFS

Hierarchical Structure of Memory Beliefs

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Abstract

This paper examines data presented by Brown, Garry, Silver, and Loftus (1997). Their presentation evaluated responses to the Beliefs about Memory Survey (BMS: Brown, Garry, Loftus, Silver, DuBois, & DuBreuil, 1996) using principal component analysis. First, we demonstrate how Rasch methods support a unidimensional interpretation of a memory beliefs variable, while reported principal component evidence indicated the notion of three dimensions. Second, we attempt to replicate our results with an independent sample from the same target population. Finally, we outline potential applications using the BMS.

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How we remember material is important, as is how we believe we may remember material and how accurate we believe those memories may or may not be. It is possible that misinformation effects (i.e., repeated false statements and underhanded information that lead people to believe they have seen or experienced something that they have not (Belli, 1989)) and confirmation bias (i.e., the tendency of people's beliefs to drive their behaviors) may cause people to search for and then ultimately remember false events. The work of Loftus and colleagues has focused on this lack of precision in a person's memory, whether related to eye-witness testimony (Loftus & Ketcham, 1991) or repressed memory (Garry, Loftus, Brown, & DuBreuil, 1994). Her theory describes a mixing of current perceptions with schematic representations of memories to cause distortions in a prior memory. These distorted memories then may appear to be real memories to the individual, but in fact have been influenced by questioning techniques, suggestion, or mere recall efforts. A person's belief that they can recover repressed or newborn memories through specific techniques, techniques and memory for which there is no scientific evidence to support, can significantly impact their belief system about memory and their recollection of 'facts' and 'events.' The study of person's memory beliefs is very important in the field of memory research as it relates to the practicality of memory for events during an observed situation, such as an argument between two people, a legal trial, or the evaluation of someone's performance (e.g., teacher observation). It also raises questions about the recall of repressed memories of abuse and violence during counseling. For example, consider the relationship between a counselor and a client. Both bring beliefs into therapy, and the confirmation bias shows that people discover what they already believe to be true. The counselor might announce to the client a certain diagnosis, then claim that a necessary step in regaining emotional health is to remember the event that triggered the trauma. The counselor could suggest an initial course of therapy whose goal is to reveal these buried memories. Acting in tandem, the counselor and client may unknowingly collaborate to create the client's false memory of the trauma.

The obvious question that follows from this scenario is what do people believe about memory? Garry, Loftus, & Brown (1994) developed a measure of people's beliefs about memory and found a surprising level of agreement with beliefs that are unsupported by scientific research. Brown, Garry, Silver, and Loftus (1997) reported similar findings. For example, 32.8% of the sample used in the Brown et al. (1997) study believed memories of physical trauma are sometimes 'stored' in the muscles of the body; 24.7% believed their present life is influenced by a previous life/lives. The data indicate that large percentages of the sample were subject to misinformation and unfounded and unsubstantiated memory beliefs. Beliefs such as these are of particular interest when people are trying to remember a specific event that has been labeled repressed. The accuracy and detail of their recollections raises some serious questions about legal testimony and decisions made based on an individual's memory of specific events. Therefore, a need for an assessment to evaluate these beliefs concerning memory may have implications in a number of scientific fields of study.

Method

Sample One thousand forty six individuals from Connecticut, South Carolina, Utah, Maryland, Texas, Oklahoma, and Montana participated in this study. These participants consisted of students from high school, community college, and university settings. Participants were also obtained from senior housing. Some of the school age participants were provided extra points in their class for participation. This sample was randomly split into approximately equal groups for the initial calibration and subsequent replication analyses. The first random sample (n=521) consisted of 162 males and 356 females (3 missing). One hundred eighty two indicated having been in group or individual therapy; 120 indicated having known someone personally who had recall therapy. The replication sample (n=525) consisted of 164 males and 359 females (2 missing). One hundred fifty one indicated having been in group or individual therapy; 127 indicated having known someone personally who had recall therapy. The age distributions for both samples are given in Table 1.

Instrument The Beliefs about Memory Survey was initially developed by Garry et al. (1994), and further revised by Brown et al. (1996) and Brown et al. (1997). The most recent version of the BMS contains 37 items on a self-report 5-point Likert scale with labels of 'Strongly Disagree', 'Disagree', 'Neutral', 'Agree', and 'Strongly Agree'. Principal component evidence provided by Brown et al. (1997) demonstrated a three component solution. Components were labeled New born, womb, and previous lives memories (6 items), Blending of memories (5 items), and Memory storage beliefs (7 items). The remaining 19 items did not covary with any of the items on the first three components. This study examines the 18 items (See Appendix for relevant sections of the BMS) from the three component solution presented by Brown et al. (1997).

Analyses All data were subjected to Rasch analyses. Rasch models are mathematical models that require unidimensionality and additivity. Unidimensionality simply means that all items measure a unitary hypothetical construct. Additivity refers to the properties of the units of measurement. These units, referred to as logits (log of odds), maintain the same size (i.e., interval) over the entire continuum. The extent to which these properties hold depends on how closely the data fit the particular Rasch model employed. Once the parameters (discussed below) of a Rasch model are estimated, they are used to compute expected response patterns. Comparison of the expected patterns and the observed patterns for persons and items result in fit statistics. These fit statistics are used as a measure of the validity of the model-data fit for items and as a indictors of invalid (with respect to the model expectations) individual response patterns for persons.

Item fit statistics are used to investigate the internal validly of the items in contributing to a unidimensional scale. The model requires that any item have a greater

probability of soliciting a higher rating for persons of higher ability than for persons of lower ability. Those items identified as not fitting the Rasch model need to be examined and either revised or eliminated as these items may not be related to the rest of the scale (i.e., assessing a construct other than that shared by the remaining items). Person fit statistics investigate the extent to which each person's response pattern correspond to that predicted by model. A valid response requires that any person have a greater probability of providing a higher rating on easier items than on more difficult items. Persons identified as misfitting may not be from the targeted sample or the content of the assessment may not be appropriate for the given person.

BIGSTEPS (Linacre & Wright, 1995) provides two fit statistics: Infit and Outfit. The Infit statistic is sensitive to unexpected responses to items near a person's ability while Outfit is sensitive to unexpected responses far from a person's ability estimate. When reported as mean squares, which is simply a chi-square divided by the appropriate degrees of freedom, these fit statistics have an expected value of one with a range from 0 to infinity. Mean square fit statistics less than one indicate redundancy, dependency, or constriction of data. Mean squares greater than one are indicative of unexpected variability, inconsistency, or extremism. An acceptable range for both Infit and Outfit mean square fit statistics is .6 to 1.4 (Wright & Linacre, 1994). In addition to the validity of model-data fit, an index of reliability is also provided. In Rasch measurement this estimate is the person separation reliability index. It is an indication of the spread of person measures along the memory beliefs continuum (i.e., how well the items identify individual differences) and is analogous in interpretation to coefficient alpha in classical test theory. There is a complementary reliability index for items that indicates the extent to which the item calibrations are spread over the memory beliefs continuum (i.e., how well the sample of persons separates the items).

The Rasch Rating Scale Model (Andrich, 1978; Wright & Masters, 1982) was used for all Rasch analyses. For the Rating Scale model, a memory beliefs measure for each person, a set of category threshold parameters common to each item, and item agreeability parameters are estimated. This model assumes that the rating scale functions in a similar manner across all items. The first calibration was used to investigate if any items had negative pt-biserials. Negative pt-biserials would indicate a need to reverse score particular items in order to define a unidirectional variable. The second item calibration was used to investigate the functioning of the rating scale using average measures and step measures. The average measure for a given rating scale category is the average ability of the respondents observed in the category averaged across all observations of the category (Linacre, 1995). Therefore, the average measures for successive rating scale categories should increase (i.e., the higher the rating scale category, the more of the construct should be present). Step measures represent the point on the variable at which adjacent categories are equally probable. When step measures are disordered, a category is never the most probable at any point along the variable. Since the intention is to have each successive category be the most probable as one proceeds along the variable, disordering is undesirable. We

thought examining the manner in which the rating scale is functioning a necessary step as the inclusion of a 'Neutral' (or Don't know, No opinion) category has a tendency to produce disorder among the average and step measures as these labels have the tendency to provide respondents a 'way out' of committing to a response. Disordered categories may be treated in several different ways depending on the meaning inherent in the rating scale labels. One may treat responses to the disordered category as missing if the label appears to be off-dimension, reverse the order of adjacent categories, or combine the responses for adjacent categories that may have been unclear to respondents (i.e., sometimes and often). Our next series of analyses investigated the dimensionality and meaning of the 18 items. Combining the two random samples, component analyses were done to replicate the solution reported by Brown et al. (1997) and to reexamine the factor structure in light of information obtained from the Rasch analyses. Rasch analyses were also replicated. Finally, a 2 x 2 ANOVA was employed to determine any differences in the memory belief estimates with gender and whether or not participants have been in group therapy serving as the independent variables.

Results

First random sample Initial calibration of the 18 items revealed two items with negative pt-biserials. Item 12, "Information in memory can decay and be permanently lost from memory", and item 13, "Some experiences can never be recovered by hypnosis, nor any other special techniques, because the information is simply no longer available" had pt-biserials of -.12 and -.14, respectively. These two items were reverse scored for all remaining analyses. The second analysis was used to investigate the functioning of the rating scale. Although average measures were ordered (-.95, -.49, -.15, .39, and .80) the step measures were disordered (-1.87, -.14, -.44, and 2.45), indicating that category '3' (Neutral) was never the most probable category at any point on the variable. Since 'Neutral' seems conceptually distinct from an Agree/Disagree continuum, we decided to treat all responses to the 'Neutral' category as missing. Subsequent analyses indicated average measures and step measures to be ordered. Using mean square Outfit statistics outside the range of .6 to 1.4, our third and fourth analyses revealed two items to misfit the model (Item 36: "I believe that my present life is influenced by any previous life/lives I may have had." and Item 35: "With the right techniques, certain people can produce accurate and vivid memories of a past life."). The mean square Outfit statistics were 1.47 and 1.53 for Items 36 and 35, respectively, indicating excessive variability among the responses and hint that these item may tap a construct not shared by the majority of other items (both items deal with past lives). Investigation of unexpected responses revealed a series of responses in the Strongly Disagree or Strongly Agree category and a lack of Disagree and Agree responses. This extreme category usage may also contribute to the misfit. Removal of these two items

and calibration of the remaining items yielded mean square Outfit and Infit statistics (see Table 2) within the acceptable range of .6 to 1.4.

Summary statistics for measured persons yielded an average person measure of .08 logits (SD = .92), indicating a good match between person measures and item calibrations (SD = .99). The person reliability index is .70 (separation 1.51); item reliability .99 (separation 11.42). Average measures corresponding to each rating scale category were -1.50, -.71, .68 and 1.65. Step measures covered a large range (5.65 logits) of the continuum with values of -2.60, -.45, and 3.05. A variable map depicting the spread of person measures and item calibrations is given in Figure 1. Items corresponding to component one in the Brown et al. (1997) study are in boldface, items from component two are underlined, and items from component three are italicized. As this map demonstrates, the three components reported by Brown et al. (1997) may be interpreted as 'difficulty' components, with items relating to New born, womb, and previous lives memories component being the most difficult to endorse; items dealing with the Blending of memories component being the easiest to endorse; and items from the Memory storage beliefs component dominating the middle portions of the continuum. The item hierarchy may also be interpreted with respect to whether or not any scientific evidence exists to support the content of the items. Item content with no scientific support (marked with an * in Figure 4) dominate the upper portions of the variable (items from the New born, womb, and previous lives memories and Memory storage beliefs components), indicating that individuals find these types of statements more difficult to agree with compared to the items defining the lower portion of the variable (items from the Blending of memories component) whose content have scientific support.

Replication sample For the replication analyses, we began with the original 18 items examined previously. The first calibration again revealed that item 12, "Information in memory can decay and be permanently lost from memory", and item 13, "Some experiences can never be recovered by hypnosis, nor any other special techniques, because the information is simply no longer available" had negative pt-biserials (-.22 and -.17, respectively). These two items were again reserved score for all remaining analyses. As with the initial sample, the second calibration found the average measures to be ordered (-1.13, -.53, -.19, .39, and .78) and the step measures unordered (-1.85, -.13, -.50, and 2.49). All responses to the 'Neutral' category were again recoded as missing with subsequent analyses indicated average measures and step measures to be ordered. Using mean square Outfit statistics outside the range of .6 to 1.4, our third and fourth analyses revealed the same problematic items cited earlier: Item 36 (mean square outfit 1.40) and item 35 (mean square outfit 1.43). Again, this excessive variability seems to stem from a combination of extreme category usage and the possibility that both items tap a dimension not shared by the remaining items (past lives). Removal of these two items and calibration of the remaining items yielded

mean square Outfit and Infit statistics (see Table 3) within the acceptable range of .6 to 1.4.

Summary statistics for measured persons yielded an average person measure of -.01 logits (SD = .95), indicating a good match between person measures and item calibrations (SD = 1.06). The person reliability index is .72 (separation 1.61); item reliability .99 (separation 12.34). Average measures corresponding to each rating scale category were -1.87, -.77, .69 and 1.52. Step measures had values of -2.57, -.47, and 3.04. A variable map depicting the spread of person measures and item calibrations is given in Figure 2. Bold, underlined, and italicized items follow the previous coding scheme.

Combined sample Given the similarity between the item hierarchies and calibrations and the lack of significant differences in the overall agreeability of the two groups ($t(1041) = 1.510$, $p = .131$) the two independent samples were pooled. The average person measure from the pooled calibration is .03 logits (SD=.94) with the item difficulty SD=1.03. Person reliability is .71 (separation 1.57) and item reliability is 1.00 (separation 16.87). Average and step measures were ordered (-1.69, -.74, .69, 1.59 and -2.84, -.30, 3.14, respectively). The correlation between the separate and pooled agreeability estimates is 1.00, indicating a consistent rank ordering in the estimated measures. Item calibrations and fit statistics are given in Table 4. Figure 3 provides a variable map of the item calibrations and person measures for the pooled sample. Bold, underlined, and italicized items follow the previous coding scheme.

Component analyses In order to investigate the influence of the category manipulation on the dimensionality as determined by principal component analysis, two sets of analyses were conducted. First, a principal component analysis was conducted on the original data in order to replicate the results reported by Brown et al. (1997). The second principal component analysis used recoded data. Based on the evaluation of the rating scale from the Rasch analyses, responses to the 'Neutral' category were recoded as missing and the original codes of 4 and 5 were recoded as 3 and 4, respectively. Both principal component analyses indicated a three component solution (using the parallel analysis method for extraction) explained the covariation among the items. Pattern coefficients (see Table 5) were comparable across the analyses with component intercorrelations being slightly larger in the analyses using the recoded data. By removing the 'Neutral' category, one may expect that noise (error variation) may be reduced. This hypothesis was supported by the amount of variance explained by the component analyses. Fifty-four percent of the variance was accounted for by the second component analysis versus 46.7% from the first component analysis.

Group differences The agreeability estimates were used for further analysis. Specifically, a 2 (gender) x 2 (received therapy) ANOVA was conducted. A statistically significant interaction was found ($F(1,960) = 4.208$, $p < .05$, eta squared = .004).

Descriptive statistics are in Table 6. Males receiving therapy are less agreeable and females receiving therapy more agreeable than the other groups. However, given the small effect size, the differences between these groups appears to be of little practical importance.

Potential Applications using the BMS

Figure 4 represents an expected score map produced by BIGSTEPS (Linacre & Wright, 1995). The expected score for each item can be obtained for each memory beliefs level by summing products of the probability of responding in a given category and the score for the same category. Items are listed in order of decreasing difficulty and the distribution of memory beliefs estimates (i.e., the number of people scoring at each logit) is located below the horizontal axis. This map also demonstrates the ordinal nature of the rating scale as the distances between consecutive integers are not equal.

We target one individual with a memory beliefs estimate just below four logits. This person's expected scores are represented by the darkened vertical line. The integer expected scores for this individual can be read directly from Figure 4. For each item, if the darkened vertical line lies to the right of the : symbol, then the expected integer response is the number to the right of the vertical line. If the line lies to the left of the : symbol, the expect integer response is the number to the left of the vertical line. As an example, this individual has an expected score of '4' for 'Remembering things before born' and '5' on 'Nothing is truly forgotten'. Depending on the situation, this profile of memory beliefs may not be a cause for alarm. However, consider a juror for a murder trial. The star witness presents testimony in great detail, being able to recall every detail of the crime scene. A juror with the beliefs represented in Figure 4 would likely believe the testimony provided by the witness as the juror's own belief system concerning memory storage and retrieval support the ability to recall great detail. The consequences could be a guilty vote. In this instance, the expected score map may be used as a screening assessment, selecting individuals for juror duty without such naïve beliefs about memory storage and retrieval. Another scenario may be the choice of counseling technique used by a therapist. The person represented in Figure 4 has strong beliefs that memories may by recovered by hypnosis or other special techniques. Knowing this, a therapist may choose not to use hypnosis, thereby avoiding the possibility of working in tandem with the client to inadvertently create false memories that may be detrimental to the clients long term recovery.

Conclusion

There are several important results that may be drawn from our analyses. From a clinical standpoint, these findings have profound implications for therapists working with clients, lawyers questioning clients and eye-witnesses, teachers instructing students in a classroom, and many of our understandings about what memory is and

how it works. As therapists ask questions of clients, they must be aware that a client's beliefs about the functioning of their memory will directly impact the events that they recall and the accuracy with which they report those events. As lawyers question people on the stand during a trial, they must consider the juries' beliefs about the memory of the event related to the testimony delivered, as well as the memory beliefs of the jury members listening to the testimony. If great detail is presented in the testimony, it appears that the jury may be more likely to believe that the person's memory of the event is more accurate than if there is impoverished detail. When teachers are instructing in their classrooms, they need to be aware that their students may have many misperceptions about memory and how it operates, and these beliefs may negatively impact the student's ability to recall instructional material. As demonstrated in the previous section, the information concerning the profile of memory belief of individuals can be readily obtained from expected score maps.

From a psychometric perspective, our analyses demonstrate that users of factor and component analysis should be wary prior to conceptualizing their construct of interest as multi-dimensional. Although Brown et al. (1997) found a three component solution, our re-analysis of their data demonstrated that the three components may reflect three levels of difficulty or more likley as a hierarchy that may be conceptualized as consisting of two groups of items; those items with and without scientific support. Additionally, our analyses caution against accepting a given response format as the most efficient format for data collection. Evaluation of the rating scale may shed light on the way respondents are using the rating scale and provide information that may be used to extract more information from the response data.

Despite our findings, it is possible that the component analysis detected the 'true' dimensionality underlying the responses. Recent work by Smith (1992) compared the ability of Rasch and factor analysis in detecting a true second dimension. Using simulated five category rating scale data for correlated factors with varying number of items per factor, Smith found that when two factors correlate less than .30 and are represented by an equal number of items, then factor analysis is better able to detect a second factor than Rasch standardized Outfit statistics. However, for all other combinations of factor correlations and number of items per factor, the Rasch standardized Outfit statistics were better or equal to factor analysis in identifying a true second factor.

Using real data, Edwards, Green, and Lyons (1996) compared principal component analysis to Rasch analysis using responses from teachers and principals to the School Culture Survey (Saphier & King, 1985). The component and Rasch analyses both yielded three dimensions. However, these findings should be interpreted with caution as the precise methodology employed was not clear. First, the type of item fit statistic employed for the Rasch analyses was not specified. Second, it was unclear if all items were subjected to the Rasch analysis simultaneously, or if three Rasch analyses were conducted using only those items contributing to the naming of the three factors.

Finally, Wright (1997) used real data from a 13 item 4 point rating scale designed to measure principal leadership. Principal component analysis with a varimax rotation yielded 3 factors with 3 items contributing to the definition of components 2 and 3. Rasch standardized Infit and Outfit statistics identified the same 3 items as not fitting with the item hierarchy defined by the remaining items. This scenario is what Wright refers to as minor multidimensionality. With minor multidimensionality a factor analysis would identify one dominant factor while the variable defined by the Rasch analyses would consist of the majority of items with the remaining items identified as misfitting. With major multidimensionality, Wright indicates that factor analysis would detect the true dimensionality and Rasch analysis to yield one variable with low person separation and poor person fit. This latter scenario may be what is occurring in the current investigation as one variable was defined, the person separation was only 1.57, and the component intercorrelations were low. However, without knowing the 'true' dimensionality and having conflicting results from the component and Rasch analyses, the issue of dimensionality may reside in which method produces the most interpretable results.

Revisions to the BMS may also be warranted. Items 12 and 13, which were reserved scored, should be rephrased to reflect the unidirectional variable shared by the remaining items. We suggest rephrasing these items as the act of reverse scoring items does not necessarily represent the opposite meaning of how the item is currently phrased (i.e., strongly agreeing with a positively phrased item does not necessarily mean the same as strongly disagreeing with the same item phrased in a negative manner). Item 13 which currently reads 'Some experiences can never be recovered by hypnosis, nor any other special techniques, because the information is simply no longer available' may be rephrased to read 'Some experiences can be recovered by hypnosis or other special techniques'. Some items also contain multiple concepts. This property has the tendency to confuse respondents as to which concept should be addressed in their response. These items should be divided into multiple items. For example, item 7, 'Everything we learn is permanently stored in the mind, although sometimes certain information is not accessible' should be divided into two items: 'Everything we learn is permanently stored in the mind' and 'Sometimes certain information is not accessible'. Given these proposed changes, the item hierarchy needs to be reestablished.

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Appendix

Selected Content of the BELIEFS ABOUT MEMORY SURVEY

Please complete this instrument focusing on your understanding and feelings about memories. The information collected here will be tabulated so that no single person can be identified.

Directions: Mark the answers on these sheets by circling the appropriate response using the response key below.

Strongly Disagree	**(SD)**
Disagree	**(D)**
Neutral	**(N)**
Agree	**(A)**
Strongly Agree	**(SA)**

3. Precise records of all our experiences are permanently stored in the brain.

SD **D** **N** **A** **SA**

7. Everything we learn is permanently stored in the mind, although sometimes certain information is not accessible.

SD **D** **N** **A** **SA**

8. It is possible for a person to remember things that happened before he/she was born.

SD **D** **N** **A** **SA**

9. Things we dream about can accidentally get confused with truly experienced events.

SD **D** **N** **A** **SA**

10. People can confuse events they merely imagined with events they truly experienced.

SD **D** **N** **A** **SA**

12. Information in memory can decay and be permanently lost from memory.

SD **D** **N** **A** **SA**

13. Some experiences can never be recovered by hypnosis, nor any other special techniques, because the information is simply no longer available.

SD **D** **N** **A** **SA**

16. "Forgetting" something just means you can't find the place where the information is permanently stored.

SD **D** **N** **A** **SA**

17. By using special therapeutic techniques, some people can remember things that happened while they were in their mother's womb.

SD **D** **N** **A** **SA**

18. Things we see on television can blend with our memories of truly experienced events.

SD **D** **N** **A** **SA**

19. Memory records and stores all of our experiences since birth.

SD **D** **N** **A** **SA**

22. Nothing is ever truly forgotten.

SD **D** **N** **A** **SA**

28. Things we read about can accidentally get confused with truly experienced events.

SD **D** **N** **A** **SA**

30. Newborn memories can sometimes be recalled with the proper therapeutic techniques.

SD **D** **N** **A** **SA**

32. People often fill in the gaps in their memory with events that 'make sense' but never actually occurred.

SD **D** **N** **A** **SA**

34. If we really focus our attention on remembering, it is possible to retrieve memories of especially important but frightening events, such as baptism or circumcision.

SD **D** **N** **A** **SA**

35. With the right techniques, certain people can produce accurate and vivid memories of a past life.

SD **D** **N** **A** **SA**

36. I believe that my present life is influenced by any previous life/lives I may have had.

SD **D** **N** **A** **SA**

38. Gender: Male___ Female___

39. Age (in years):
___ Less than 19
___ 19 - 29
___ 30 - 39
___ 40 - 49
___ 50 - 59
___ 60 - 69
___ 70 - 79
___ 80 - 89

40. Have you ever been in group or individual therapy for any reason?
Yes___ No___

The *Beliefs About Memory Scale* is authored by Scott Brown, Maryanne Garry, Elizabeth Loftus and Bethany Silver. This Scale is not to be used without written permission of the first author.

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Table 1
Frequency of self-reported age group membership

	First Sample	Replication Sample
Less than 19	57	70
19-29	335	321
30-39	53	42
40-49	30	36
50-59	9	12
60-60	7	15
70-79	24	27
80 plus	3	1
Missing	3	1

Table 2
Results of item calibration for the first random sample

ENTRY NUM	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	OUTFIT MNSQ	ITEM
3	1139	456	.33	.08	1.31	1.37	I3
8	794	427	1.93	.08	1.28	1.27	I8
10	1287	452	-.74	.09	1.20	1.20	I10
34	743	324	.79	.09	1.10	1.14	I34
18	1156	420	-.44	.09	1.06	1.09	I18
30	723	310	.69	.09	.99	1.02	I30
12	946	407	.73	.08	.95	1.00	I12
7	1336	449	-1.13	.09	1.00	.96	I7
9	1407	458	-1.51	.09	.96	.95	I9
19	1081	403	-.19	.09	.95	.95	I19
13	850	349	.52	.09	.91	.93	I13
28	1175	423	-.52	.09	.85	.87	I28
22	1082	413	-.01	.08	.83	.85	I22
17	697	361	1.71	.09	.85	.86	I17
32	1226	412	-1.18	.09	.70	.70	I32
16	1321	451	-.98	.09	.70	.68	I16
MEAN	1060.	407.	.00	.09	.98	.99	
S.D.	230.	46.	.99	.00	.17	.18	

Note. See Appendix for item content.

Table 3
Results of item calibration for replication sample

ENTRY NUM	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	OUTFIT MNSQ	ITEM
3	1108	454	.38	.08	1.25	1.27	I3
8	751	432	2.17	.08	1.19	1.21	I8
10	1345	472	-.83	.08	1.14	1.11	I10
9	1420	464	-1.53	.09	1.07	1.11	I9
34	863	393	.84	.09	1.07	1.09	I34
7	1366	460	-1.22	.09	1.11	1.08	I7
13	794	325	.32	.09	1.02	1.06	I13
17	697	372	1.78	.08	.94	.96	I17
32	1257	423	-1.22	.09	.99	.95	I32
19	1064	404	-.12	.09	.91	.90	I19
22	1086	421	.22	.08	.90	.90	I22
18	1237	443	-.66	.08	.93	.88	I18
12	937	407	.70	.08	.83	.84	I12
30	683	310	.91	.09	.78	.78	I30
16	1314	457	-.86	.09	.79	.76	I16
28	1185	423	-.68	.09	.72	.70	I28
MEAN	1069.	416.	.00	.09	.98	.98	
S.D.	244.	46.	1.06	.00	.15	.16	

Note. See Appendix for item content.

Table 4
Results of item calibration for pooled sample

ENTRY NUM	RAW SCORE	COUNT	MEASURE	ERROR	INFIT MNSQ	OUTFIT MNSQ	ITEM
3	2247	910	.35	.06	1.28	1.33	I3
8	1545	858	2.06	.06	1.24	1.24	I8
10	2632	923	-.79	.06	1.17	1.16	I10
34	1606	707	.82	.06	1.08	1.11	I34
9	2827	922	-1.53	.06	1.02	1.03	I9
7	2702	909	-1.18	.06	1.06	1.03	I7
13	1644	674	.43	.06	.97	1.00	I13
18	2393	863	-.55	.06	1.00	.99	I18
19	2145	807	-.15	.06	.93	.93	I19
12	1883	814	.72	.06	.89	.92	I12
30	1406	620	.81	.07	.89	.91	I30
17	1394	733	1.76	.06	.90	.91	I17
22	2168	834	.00	.06	.87	.88	I22
32	2483	835	-1.21	.06	.85	.83	I32
28	2360	846	-.60	.06	.79	.79	I28
16	2635	908	-.92	.06	.75	.73	I16
MEAN	2129.	823.	.00	.06	.98	.99	
S.D.	472.	90.	1.03	.00	.15	.16	

Note. See Appendix for item content.

Table 5
Pattern and factor intercorrelation matrix for the principal component analysis of original (recoded) responses

Item	Component Name		
	Memory Beliefs	Blending of Memories	New born, womb, and previous lives memories
7	.71(.70)	.11(.01)	-.06(-.02)
22	.70(.76)	.00(-.04)	.08(.09)
3	.69(.77)	-.04(.09)	.00(.06)
16	.66(.53)	.17(.45)	.00(.14)
12	.62(.80)	-.08(-.03)	-.08(-.11)
13	.59(.74)	-.18(-.19)	.01(-.12)
19	.58(.57)	.01(-.01)	.25(.34)
28	-.03(-.07)	.79(.82)	.06(-.04)
18	-.05(-.01)	.72(.75)	.09(.09)
9	.03(.07)	.68(.68)	-.02(-.04)
32	.03(.04)	.64(.62)	-.07(-.20)
10	-.01(-.13)	.59(.62)	-.03(.00)
17	.02(.16)	.03(-.06)	.78(.79)
35	-.10(.04)	-.07(-.12)	.74(.71)
30	.06(-.04)	.07(.10)	.69(.82)
36	-.05(-.12)	-.07(-.03)	.67(.65)
8	.06(.14)	.02(-.06)	.65(.68)
34	.06(-.05)	.03(.02)	.53(.61)

table continues

Prerotated Eigenvalue	3.76(4.70)	2.49(2.87)	2.15(2.16)

Factor Intercorrelation matrix

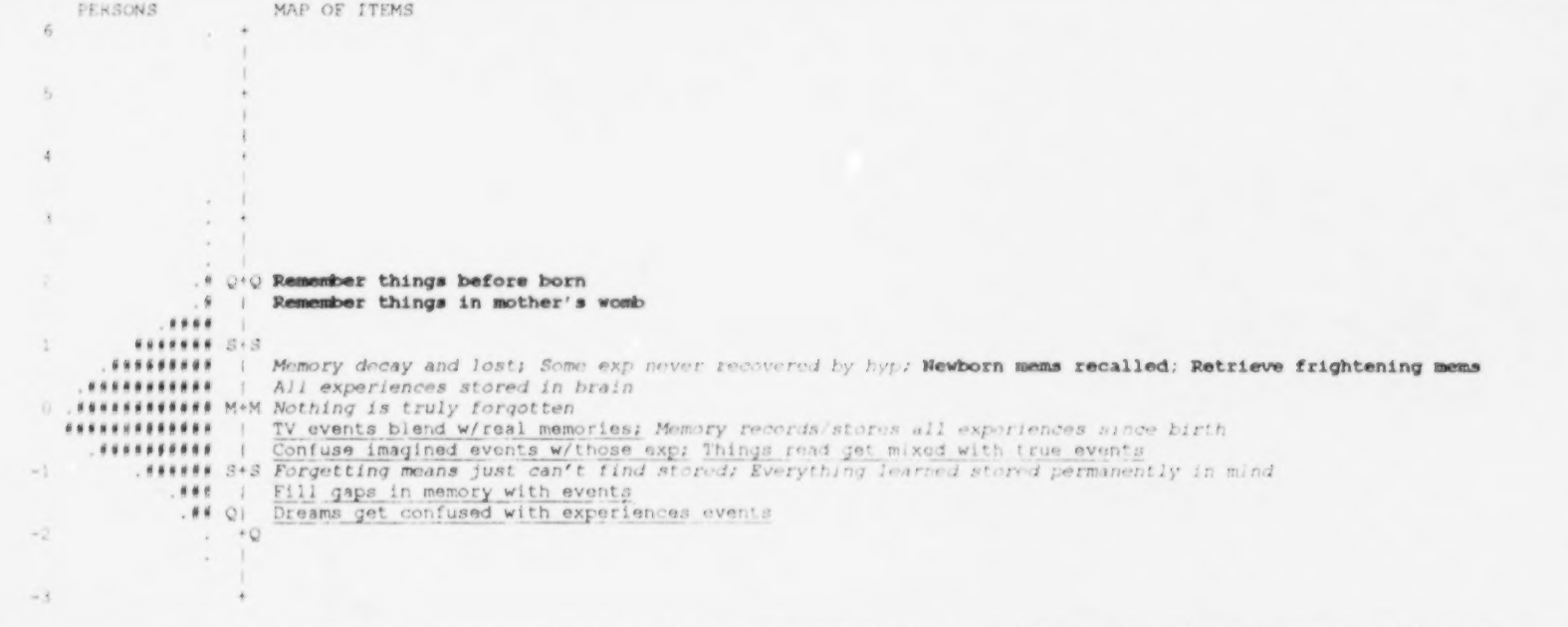
	Memory Beliefs	Blending of Memories
Memory Beliefs		
Blending of Memories	.00(-.01)	
New born, womb, and previous lives memories	.23(.35)	.03(-.12)

Note. See Appendix for item content.

Table 6
Mean (SD) for each gender x therapy group combination

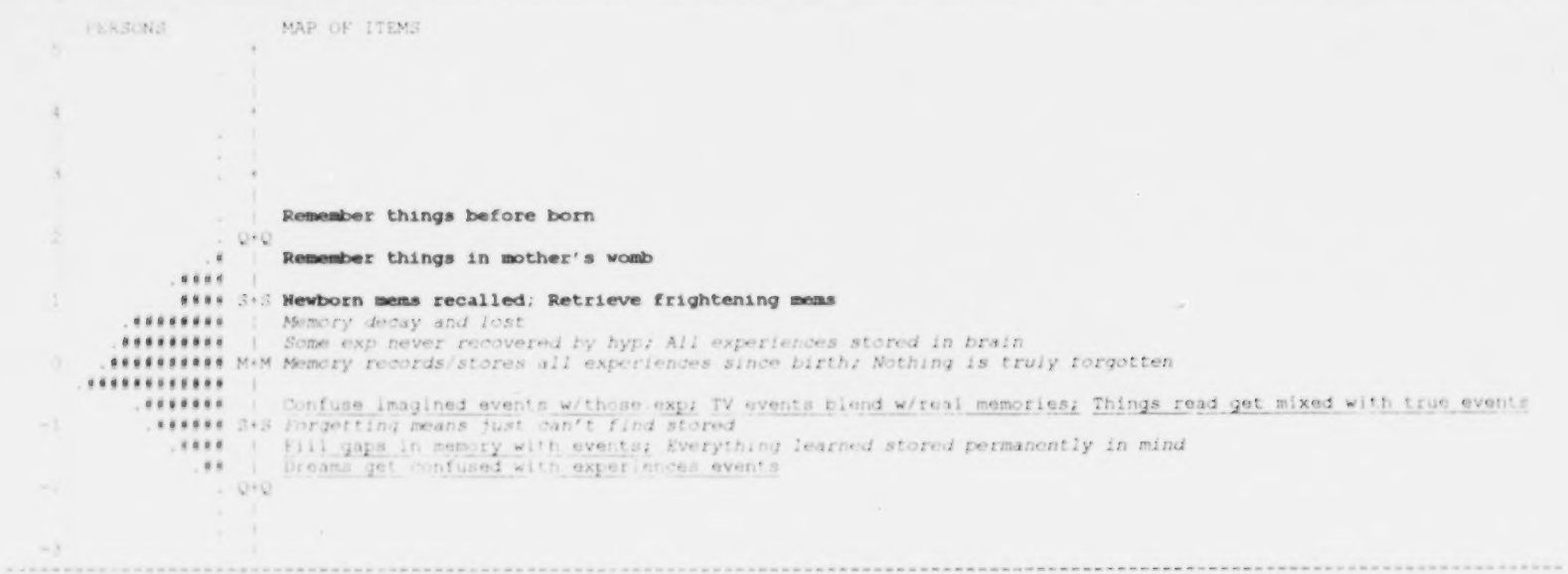
	Received Therapy?	
Gender	Yes	No
Male	-.27 (.84)	-.04 (1.00)
Female	.13 (1.00)	-.06 (.86)

Figure 1. Variable map for the Beliefs about Memory survey - First random sample.


PERSONS
MAP OF ITEMS
Remember things before born
Remember things in mother's womb
Memory decay and lost; Some exp never recovered by hyp; Newborn mems recalled; Retrieve frightening mems
All experiences stored in brain
Nothing is truly forgotten
TV events blend w/real memories; Memory records/stores all experiences since birth
Confuse imagined events w/those exp; Things read get mixed with true events
Forgetting means just can't find stored; Everything learned stored permanently in mind
Fill gaps in memory with events
Dreams get confused with experiences events

Note. M = mean, S = one standard deviation, and Q = two standard deviations. Each # represents 6 persons, each . 1 to 5 persons. See Appendix for item content.

Figure 2. Variable map for the Beliefs about Memory survey - Replication sample.


PERSONS
MAP OF ITEMS
Remember things before born
Remember things in mother's womb
Newborn mems recalled; Retrieve frightening mems
Memory decay and lost
Some exp never recovered by hyp; All experiences stored in brain
Memory records/stores all experiences since birth; Nothing is truly forgotten
Confuse imagined events w/those exp; TV events blend w/real memories; Things read get mixed with true events
Forgetting means just can't find stored
Fill gaps in memory with events; Everything learned stored permanently in mind
Dreams get confused with experiences events

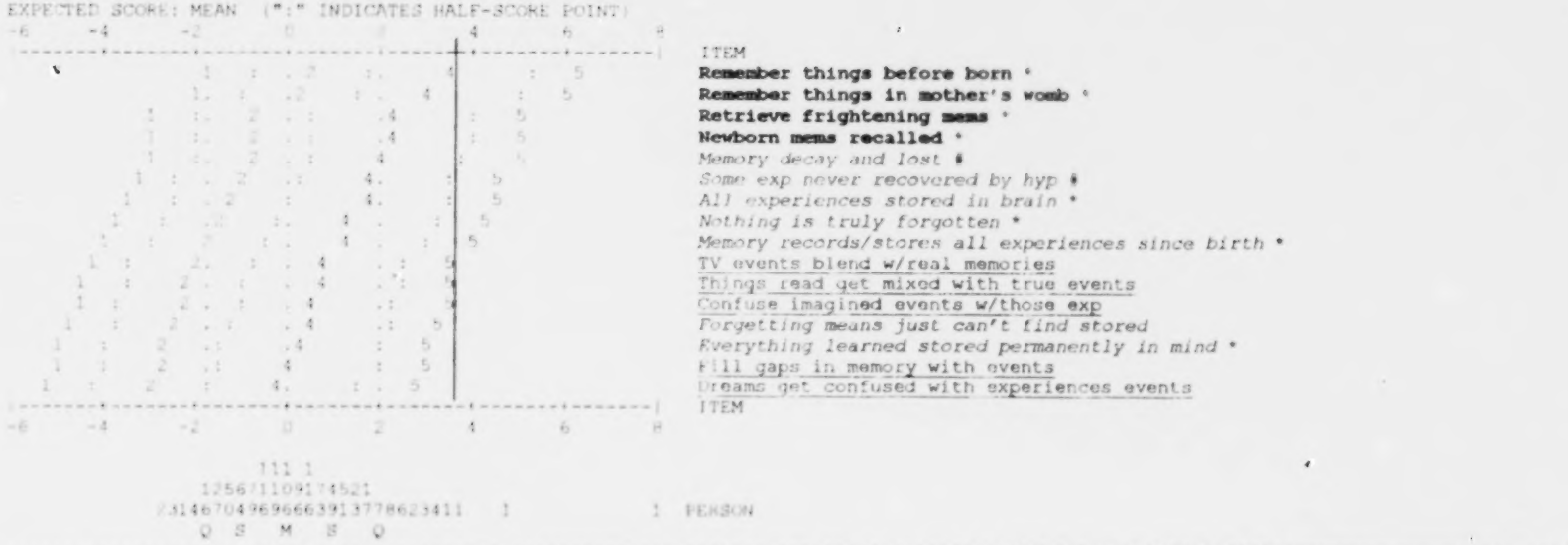
Note. M = mean, S = one standard deviation, and Q = two standard deviations. Each # represents 7 persons, each . 1 to 6 persons. See Appendix for item content.

Figure 3. Variable map for the Beliefs about Memory survey - Pooled sample.

PERSONS
MAP OF ITEMS
Q+Q Remember things before born
Remember things in mother's womb
S+S
Memory decay and lost; Newborn mems recalled; Retrieve frightening mems
Some exp never recovered by hyp; All experiences stored in brain
M+M Memory records/stores all experiences since birth; Nothing is truly forgotten
Confuse imagined events w/those exp; TV events blend w/real memories; Things read get mixed with true events
S+S Forgetting means just can't find stored
Fill gaps in memory with events; Everything learned stored permanently in mind
Dreams get confused with experiences events
Q+Q

Note. M = mean, S = one standard deviation, and Q = two standard deviations. Each # represents 13 persons, each . 1 to 12 persons. See Appendix for item content.

Figure 4. Expected score map - Pooled sample.


EXPECTED SCORE: MEAN (":" INDICATES HALF-SCORE POINT)
-6 -4 -2 0 2 4 6 8
ITEM
Remember things before born *
Remember things in mother's womb *
Retrieve frightening mems *
Newborn mems recalled *
Memory decay and lost #
Some exp never recovered by hyp #
All experiences stored in brain *
Nothing is truly forgotten *
Memory records/stores all experiences since birth *
TV events blend w/real memories
Things read get mixed with true events
Confuse imagined events w/those exp
Forgetting means just can't find stored
Everything learned stored permanently in mind *
Fill gaps in memory with events
Dreams get confused with experiences events
ITEM
PERSON
M S Q

Note. M = mean, S = one standard deviation, and Q = two standard deviations. * indicates no scientific support for item content. # indicates item reverse scored. See Appendix for item content.